

REMARKS

I. Introduction

Claims 10 to 18 are pending in the present application. In view of the preceding amendments and following remarks, it is respectfully submitted claims 10 to 18 are allowable, and reconsideration is respectfully requested.

Applicants thank the Examiner for acknowledging that copies of the certified copies of the priority documents have been received in the National Stage from the International Bureau.

Applicants thank the Examiner for acknowledging the receipt of an Information Disclosure Statement, USPTO-1449 and references cited therein.

II. Rejection of Claims 10 to 18 Under 35 U.S.C. §112, Second Paragraph

Claims 10 to 18 were rejected under 35 U.S.C. §112, second paragraph as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. The Office Action states that the phrase "a ratio of a niobium content less 0.5% to an iron content and at least one of not supplemented and supplemented by at least one of a chromium and a vanadium content higher than 2.5" renders the claim indefinite.

Applicants have amended claims 10, 13, 14, 15 and 18 to recite that a ratio of $(Nb - 0.5\%)/(Fe+Cr+V)$ is higher than 2.5. Support for the amendment to claims 10, 13, 14, 15 and 18 is found, for example, on page 6, lines 15 to 16 and 27 of the specification. Applicants have further amended claims 10, 13, 14, 15 and 18 to remove the recitation of a niobium content less 0.5% to a iron content and at least one of not supplemented and supplemented by at least one of a chromium and a vanadium content.

Applicants respectfully submit that the rejections to claims 10 to 18 have been obviated and respectfully request withdrawal of the rejections to claims 10 to 18.

III. Rejection of Claims 10 to 17 Under 35 U.S.C. §103(a)

Claim 10 to 17 were rejected under 35 U.S.C. §103(a) as being unpatentable over WO 93/16205 in view of United States Patent 5,832,050 ("Rebeyrolle"). Applicants respectfully submit that the combination of WO 93/16205 and Rebeyrolle does not render obvious claims 10 to 17 for the following reasons.

Claim 10 relates to a zirconium based alloy. Claim 10 recites a configuration having zirconium and in addition to unavoidable impurities, by weight, from 0.02 to 1% iron; from 0.8 % to 2.3% niobium, less than 2000 ppm tin, less than 2000 ppm oxygen, less than 100 ppm carbon, from 5 to 35 ppm sulfur and from 0.01% to 0.25% in total of at least one of chromium and vanadium. Claim 10 has been amended such that a ratio $(Nb - 0.5\%)/(Fe+Cr+V)$ is higher than 2.5.

Claim 13 relates to a tube. Claim 13 recites a tubular arranged zirconium-based alloy wherein the alloy comprises: zirconium; and in addition to unavoidable impurities, by weight, from 0.02 to 1% iron; from 0.8 to 2.3% niobium, less than 2000 ppm tin, less than 2000 ppm oxygen, less than 100 ppm carbon, from 5 to 35 ppm sulfur and from 0.01% to 0.25% in total of at least one of chromium and vanadium, a ratio of $(Nb - 0.5\%)/(Fe+Cr+V)$ being higher than 2.5 in a recrystallized state.

Claim 14 relates to a flat product. Claim 14 recites a flat arranged zirconium based alloy wherein the alloy comprises zirconium; and in addition to unavoidable impurities, by weight, from 0.02 to 1% iron; from 0.8% to 2.3% niobium, less than 2000 ppm tin, less than 2000 ppm oxygen, less than 100 ppm carbon, from 5 to 35 ppm sulfur and from 0.01 % to 0.25% in total of at least one of chromium and vanadium, a ratio $(Nb - 0.5\%)/(Fe+Cr+V)$ being higher than 2.5 in a recrystallized state.

Claim 15 relates to a method of using a component comprising: providing the component made of an alloy comprising: zirconium; and in addition to unavoidable impurities, by weight, from 0.02 to 1% iron; from 0.8 % to 2.3% niobium, less than 2000 ppm tin, less than 2000 ppm oxygen, less than 100 ppm carbon, from 5 to 35 ppm sulfur and from 0.01% to 0.25% in total of at least one of chromium and vanadium, a ratio of $(Nb - 0.5\%)/(Fe+Cr+V)$ being higher than 2.5 in a recrystallized state; and

utilizing the component in a pressurized water reactor, wherein water initially contains less than 3.5 ppm of lithium.

The Office Action merely uses Rebeyrolle to allegedly provide the presence of 8 to 30 ppm of sulfur.

The combination of Rebeyrolle and WO 93/16205 does not disclose or suggest the presence of a ratio of $(\text{Nb} - 0.5\%)/(\text{Fe} + \text{Cr} + \text{V})$ which is higher than 2.5 as required in claims 10, 13, 14 and 15. Claims 11, 12, 15 and 17 depend from the independent claims and therefore include the features of the independent claims. As provided in the specification of the present invention on page 6, lines 24 to 27, when a ratio of $(\text{Nb} - 0.5\%)/(\text{Fe} + \text{Cr} + \text{V})$ is higher than 2.5, intermetallic components that have only a predominately hexagonal structure are produced. WO 93/16205 and Rebeyrolle are silent with regards to maintaining this ratio or that maintaining this ratio will achieve intermetallic components that have a predominately hexagonal structure with $\text{Zr}(\text{Nb}, \text{Fe})_2$ which gives a good resistance to uniform corrosion in non-lithiated water at high temperature. WO 93/16205 does not disclose or suggest the influence of different types of intermetallic compounds which may be present in an alloy. As a result of both references failing to disclose this feature, the rejection to claims 10 to 17 should fail as each of these claims provides this feature.

WO 93/16205 is also silent with regards to providing 0.01% to 0.25% in total of at least one of chromium and vanadium. The claims of the current invention explicitly require this sum of elements to be within a precise upper and lower limit, wherein the lower limit is a non-zero value. WO 93/16205 is silent with regards to this sum of elements, merely providing "optional" elements.

Applicants furthermore respectfully submit that claims 10 and 11 provide a significantly wider range of iron than WO 93/16205. Claim 12, while providing a more restricted range than claims 10 and 11, does not include the preferred values of iron found in WO 93/16205.

Applicants furthermore respectfully submit that WO 93/16205 does not disclose or suggest the **compulsory** addition of niobium. WO 93/16205 is silent with regards to such a compulsory addition. WO 93/16205 provides a different range of niobium than claims 10, 11 and 12, except for very restricted ranges of a top 20% of WO 93/16205 and a precise value of 1%.

Applicants furthermore submit that WO 93/16205 provides a range of tin which does not disclose or suggest the benefits of working at a narrow low range. Moreover, page 3, lines 1 and 2 (as cited by the Examiner), actually indicate that by lowering the tin content, the corrosion resistance is improved, however this in turn downgrades the creep resistance and consequently, the contents in the other elements must be adjusted in order to reach a satisfactory result. As a result, the reference itself teaches away from the compositions and methods provided in the present applications claims.

WO 93/16205 requires a specific range of values for chromium taken alone. Claims 10 and 11 of the current invention have no precise requirement for chromium and are therefore different. WO 93/16205 requires a very wide ranges of vanadium, while claims 10 and 11 have no precise range requirement.

Applicants furthermore submit that elements Sb and Te are added in WO 93/16205 in order to reduce hydrogen uptake. Applicants respectfully submit that Sb and Te are not included in the claims of the current invention. WO 93/16205 also has a specified range and precise requirements for silicon addition. The addition of silicon is linked to reduction of hydrogen uptake and to the reduction of the variations in the corrosion resistance in the processing history of the alloy. In the claims of the current invention, silicon is present only as an impurity.

Applicants furthermore state that the teaching of WO 93/16205, taken as a whole, does not disclose or suggest the precise ranges of elements presented in the independent claims in the present invention. The combination of references do not disclose the simultaneous presence of high Nb content and low contents in Fe and Cr. WO 93/16205 leads a person skilled in the art to have a chromium content of .25% and a significant presence of vanadium, different than the requirements of claim 10, for example. Applicants furthermore submit that WO 93/16205 suggests a high Nb content in order to precipitate β Nb and simultaneously a relatively high Cr content in order to increase resistance to corrosion. This would entail having a Cr content of typically 0.25%, out of the range of Cr provided in claim 12.

Applicants furthermore submit that WO 93/16205 insists on obtaining ZrV₄, while the current application does not encourage such formations. The

current invention and claims encourage the formation of $Zr(Nb,Fe)_2$, different than WO93/16205 and Rebeyrolle.

Claims 13, 14, 15 and 18 have been amended to include the alloy composition provided in claim 10, including the feature of (Nb-0.5%)/(Fe+Cr+V) being higher than 2.5 in a recrystallized state. Applicants respectfully submit that claims 13, 14, 15 and 18 are likewise not rendered obvious by the combination of WO 93/16205 and Rebeyrolle.

In rejecting a claim under 35 U.S.C. §103(a), the Examiner bears the initial burden of presenting a prima facie case of obviousness. In re Rijckaert, 9 F.3d 1531, 1532, 28 U.S.P.Q.2d 1955, 1956 (Fed. Cir. 1993). To establish prima facie obviousness, three criteria must be satisfied. First, there must be some suggestion or motivation to modify or combine reference teachings. In re Fine, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988). This teaching or suggestion to make the claimed combination must be found in the prior art and not based on the application disclosure. Second, there must be a reasonable expectation of success. In re Merck & Co., Inc., 800 F.2d 1091, 23 U.S.P.Q. 375 (Fed. Cir. 1986). Third, the prior art references must teach or suggest all of the claim limitations. In re Royka, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974). As indicated above, the combination of WO 93/16205 and Rebeyrolle do not disclose or suggest the features of the claims of the current invention as a whole.

It is respectfully submitted that the cases of In re Fine, supra, and In re Jones, 21 U.S.P.Q.2d 1941 (Fed. Cir. 1992), make plain that the Office Action's generalized assertions that it would have been obvious to modify or combine the references do not properly support a 35 U.S.C. §103 rejection. It is respectfully submitted that the Office Action reflects a subjective "obvious to try" standard, and therefore does not reflect the proper evidence to support an obviousness rejection based on the reference is relied upon. In particular, the Court in the case of In re Fine stated that:

The PTO has the burden under §103 to establish a prima facie case of obviousness. It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead

that individual to combine the relevant teachings of the references. This it has not done....

Instead, the examiner relies on hindsight in reaching his obviousness determination.... One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.

In re Fine, 5 U.S.P.Q.2d at 1598 to 1600 (citations omitted; italics in original; emphasis added). Likewise, the Court in the case of In re Jones stated that:

Before the PTO may combine the disclosures of two or more prior art preferences in order to establish a prima facie obviousness, there must be some suggestion for doing so, found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art....

Conspicuously missing from this record is any evidence, other than the PTO's speculation (if they'd be called evidence) that one of ordinary skill... would have been motivated to make the modifications...necessary to arrive at the claimed [invention].

In re Jones, 21 U.S.P.Q.2d at 1943, 1944(citations omitted; italics in original).

This is exactly the case here since it is believed and respectfully submitted that the present Office Action offers no evidence whatsoever, but only conclusory hindsight, reconstruction, and speculation, which these cases have indicated does not constitute evidence that will support a proper obviousness finding. Unsupported assertions are not evidence as to why a person having ordinary skill in the art would be motivated to modify or combine references to provide the claimed subject matter of the claims to address the problems met there by. Accordingly, the Office must provide proper evidence of a motivation for modifying or combining the references to provide the claimed subject matter.

More recently, the Federal Circuit in the case of In re Kotzab has made plain that even if a claim concerns a "technologically simple concept"--which is not the case here--there still must be some finding as to the "specific understanding or principle within the knowledge of a skilled artisan" that would motivate a person having no knowledge of the claim subject matter to "make the combination in the matter claimed," stating that:

In this case, the Examiner and the Board fell into the hindsight trap. The idea of a single sensor controlling multiple valves, as opposed to multiple sensors controlling multiple valves, is a technologically simple concept. With this simple concept in mind, the Patent and Trademark Office found prior art statements that in the abstract appeared to suggest the claimed limitation. But, there was no finding as to the specific understanding or principle within the knowledge of a skilled artisan that would have motivated one with no knowledge of Kotzab's invention to make the combination in the matter claimed. In light of our holding of the absence of a motivation to combine the teachings in Evans, we conclude that the Board did not make out a proper prima facie case of obviousness in rejecting [the] claims... under 35 U.S.C. Section 103(a) over Evans.

In re Kotzab, 55 U.S.P.Q.2d 1313, 1318 (Fed. Cir. 2000). Again, it is believed that there have been no such findings.

Applicants respectfully submit that the primary feature of WO 93/16205 is to improve creep resistance without downgrading other properties. The present invention seeks to improve resistance to uniform corrosion in non-lithium containing water under pressure. The purposes of the cited references are different than the current application and consequently the technical features of the documents are different.

In view of the foregoing, it is respectfully submitted that the combination of WO 93/16205 and Rebeyrolle does not render obvious claims 10 to 17.

IV. Rejection of Claims 10 to 17 Under 35 U.S.C. §103(a)

Claims 10 to 17 were rejected under 35 U.S.C. §103(a) as being unpatentable over FR 2,769,637 in view of Rebeyrolle. Applicants

respectfully submit that the combination of FR 2,769,637 and Rebeyrolle does not render obvious claims 10 to 17 for the following reasons.

Applicants respectfully submit that FR 2,769,637 requires compositions which have Sn contents of at least 0.2% while the present invention requires Sn contents strictly under 0.2%. As a result, FR 2,769,637 does not disclose or suggest the features of claims 10 to 17. Applicants furthermore submit that examples 22, 33 to 40 and 55 have a Nb content notably lower than the minimum value required by the invention. Examples 44 and 64 have (Nb-0.5%)/(Fe+Cr) ratios of 1.69 and 1.39, different than the independent claims of the present invention. Additionally, FR 2,769,637 does not disclose or suggest this ratio, because if the values provided in FR 2,769,637 are used, the maximum value which may be obtained is = 2, less than the requirements of the current invention. Moreover, FR 2,769,637 does not disclose or suggest the S values provided in the current application.

The addition of Rebeyrolle does not cure the defects of FR 2,769,637. Rebeyrolle does not disclose or suggest the feature of a (Nb-0.5%)/(Fe+Cr) ratio being larger than 2.5. All examples provided in each of the references fail to disclose or suggest this relationship and as a result, there is no overlapping of the features of the claims of the current invention and the features of the references, singularly and combined. As a result, the combination of references does not disclose or suggest the features of claims 10 to 17. Applicants respectfully request withdrawal of the rejections to claims 10 to 17.

V. Rejection of Claim 18 Under 35 U.S.C. §103(a)

Claim 18 was rejected under 35 U.S.C. §103(a) as being unpatentable over FR 2,769,637 in view of Rebeyrolle and ASM Handbook Vol. 2 (hereinafter ASM). Applicants respectfully submit that the combination of FR 2,769,637, Rebeyrolle and ASM does not render obvious claim 18 for the following reasons.

Claim 18 relates to a method for making a tube to constitute at least one of all and an external portion of at least one of nuclear fuel rod cladding and a guide tube for a nuclear fuel assembly. Claim 18 recites the features of producing a bar from a zirconium-based alloy also containing by

weight apart from unavoidable impurities, by weight, from 0.02 to 1% iron; from 0.8% to 2.3% niobium, less than 2000 ppm tin, less than 2000 ppm oxygen, less than 100 ppm carbon, from 5 to 35 ppm sulfur and from 0.01% to 0.25% in total of at least one of chromium and vanadium, a ratio $(Nb - 0.5\%)/(Fe+Cr+V)$ being higher than 2.5; water-quenching the bar after heating at from 1000°C to 1200°C; extruding a blank after heating at from 600°C to 800°C; cold rolling the blank in at least two passes to obtain a tube, with intermediate thermal treatments at from 560 C to 620 C; and carrying out a final thermal treatment at from 560 C to 620 C, all of the thermal treatments being carried out in at least one of an inert atmosphere and under vacuum. Claim 18 provides a method to make a tube which has the composition of the alloy cited in claim 10. As provided above, applicants respectfully submit that claim 18 is not rendered obvious by FR 2,769,637 and Rebeyrolle as these references do not disclose or suggest any relation to an alloy provided in claim 18.

The addition of ASM does not cure the critical defects of FR 2,769,637 and Rebeyrolle. ASM does not disclose or suggest any alloy with the features presented in claim 18. The ASM document does not disclose or suggest intermediate annealings. Moreover, the process of claim 18 requires that all intermediate anneals separating the cold-rolling passes take place between 560 and 620 degrees C. FR 2,769,637 and Rebeyrolle are silent in this regards. In FR 2,769,637 the anneal preceding the final cold-rolling pass takes place between 650 and 770 degrees C. All examples in the cited references occur at annealing temperatures higher than the maximum temperature allowed in claim 18. Applicants respectfully submit that the combination of references does not disclose or suggest the features of claim 18. Applicants respectfully request withdrawal of the rejection to claim 18.

VI. Rejection of Claims 10, 11 and 13 to 17 Under the Judicially Created Doctrine of Obviousness-Type Double Patenting

The Office Action provisionally rejects claims 10, 11 and 13 to 17 under the judicially created doctrine of obviousness-type double patenting to claims 1 to 13 of U.S. Patent 6,544,361. Applicants acknowledge the provisional rejection of the respective claims and respectfully submit that the amendment

to claims 10, 13, 14 and 15 places claims 10, 11 and 13 to 17 in condition for allowance.


VII. Conclusion

It is therefore respectfully submitted that the pending claims are allowable. All issues raised by the Examiner have been addressed, and an early and favorable action on the merits is solicited.

Respectfully submitted,

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